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UTILITY PATENT APPLICATION TRANSMITTAL

jc713 U.S. PTO
03/17/00

Address to: Box PATENT APPLICATION Assistant Commissioner for Patents Washington, DC 20231	Attorney Docket No. VEI0313PUS
	Inventor(s) or Application Identifier: Jason T. Murar and David Davis

jc678 U.S. PTO
03/17/00
09/528761

1. This application entitled Molding Method and Metal-Covered Component Formed Thereby is:

- a. ☐ A new application under 37 C.F.R. §1.53(b).
- b. ☒ A ☐ continuation ☐ divisional or ☒ continuation-in-part application under 37 C.F.R. § 1.53(b) of prior application Serial No. 09/083,943 filed on 05/22/1998 entitled Method of Manufacutring an In-Mold Laminate Component.

Application elements and other attached papers:

2. ☒ Specification (incl. Claims and Abstract) [Total Pages 16]
3. ☒ Drawings (☐ informal ☐ formal) [Total Sheets 2]
4. ☐ Oath or Declaration
- a. ☐ Newly-executed
- b. ☐ Copy from a prior application (37 C.F.R. § 1.63(d))
5. ☐ Incorporation By Reference: The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Item 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. ☐ This application is filed by fewer than all the inventors named in the prior application, 37 C.F.R. § 1.53(d)(4).
- a. ☐ **DELETE** the following inventor(s) named in the prior nonprovisional application:
- b. ☐ The inventor(s) to be deleted are set forth on a separate sheet attached hereto.

CERTIFICATION UNDER 37 C.F.R. § 1.10

I hereby certify that this UTILITY PATENT APPLICATION TRANSMITTAL and the documents referred to as attached therein are being deposited on the below date with the United States Postal Service in an envelope as "Express Mail Post Office to Addressee" addressed to: Box Patent Application, Assistant Commissioner for Patents, Washington, D.C. 20231.

Express
Mail Label No. EL481657833US

Date of Deposit: March 17, 2000

Donna Blake
(Type or print name of person mailing paper)
Donna Blake
(Signature of person mailing paper)

7. Preliminary Amendment:

- a. ☐ A Preliminary Amendment is attached.
- b. ☐ Cancel in this application original claims _____ of the prior application before calculating the filing fee.
- c. ☐ Please amend the specification by inserting before the first line the sentence:
- "This is a
 ☐ continuation
 ☐ divisional
 of copending application(s)
 Serial number ☐ / ☐ filed on ☐.
- d. ☐ A Petition to Suspend Prosecution For The Time Necessary to File An Amendment (New Application Filed Concurrently) is attached.

8. Small entity status:

- a. ☐ A small entity statement is attached.
- b. ☐ A small entity statement was filed in the prior nonprovisional application and such status is still proper and desired.
- c. ☐ Is no longer desired.

9. Fee Calculation:

FOR	NUMBER FILED	NUMBER EXTRA	RATE	CALCULATIONS
TOTAL CLAIMS (37 C.F.R. § 1.16(c))	19 -20 =	0	X 18.00	0.00
INDEPENDENT CLAIMS (37 C.F.R. § 1.16(b))	4 -3 =	1	X 78.00	78.00
MULTIPLE DEPENDENT CLAIMS (if applicable) (37 C.F.R. § 1.16(d))			260.00	260.00
			BASIC FEE (37 C.F.R. § 1.16(a))	690.00
Total of above Calculations =				1028.00
Reduction by 50% for filing by small entity (Note 37 C.F.R. §§ 1.9, 1.27, 1.28)				
Assignment Recordal Fee			40.00	0.00
TOTAL =				1028.00

10. ☒ A check in the amount of \$ 1028.00 is enclosed.
11. ☒ The Commissioner is hereby authorized to credit overpayments or charge the following fees (or any deficiency therein) to Deposit Account No. 02-3978:
- a. ☒ Fees required under 37 C.F.R. § 1.16.
- b. ☒ Fees required under 37 C.F.R. § 1.17.

12. Maintenance of Copendency of Prior Application

☐ A request for extension of time and the appropriate fee have been filed in the pending **prior** application (or are being filed in the prior application concurrently herewith) to extend the period for response until _____.

13. ☐ An Information Disclosure Statement (IDS) is attached, along with the following indicated attachments thereto:

a. ☐ Form PTO/SB/08 (_____ sheet(s))

b. ☐ Copies of references cited

14. ☐ Certified copy of priority document(s)

15. ☒ Return Receipt Postcard

16. ☐ Other: _____

17. ☒ An Assignment of the invention to Larry J. Winget

a. ☐ is attached.

b. ☒ was recorded on 8/7/1998 at Reel 9371, Frame 0980.

18. The power of attorney in the prior application is to:

Name of Attorney of Record	Reg. No.
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☐ The power appears in the original papers in the prior application.

☐ The power does not appear in the original papers, but was filed on _____.

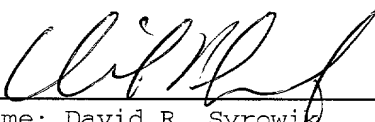
☐ A new power has been executed and is attached.

19. Correspondence Address: Please address all future communications to:

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Respectfully submitted,

Date March 17, 2000



 Name: David R. Syrowik
 Registration No.: 27,956

☐ Attorney or agent of record
☒ Filed under Rule 34(a)

MOLDING METHOD AND METAL-COVERED COMPONENT FORMED THEREBY

CROSS-REFERENCE TO RELATED APPLICATIONS

5 This application is a continuation-in-part of U.S. Patent Application
Serial No. 09/083,943, filed May 22, 1998, entitled "Method Of Manufacturing An
In-Mold Laminate Component". This application is related to U.S. patent
application Serial No. 09/144,315, filed August 31, 1998, entitled "Foil Covered
Plastic Part and Method of Making Same".

TECHNICAL FIELD

10 This invention relates to molding methods and metal-covered parts
formed thereby and, in particular, to molding methods and metal-covered plastic
parts formed thereby which are adapted for use on motor vehicles such as partial or
entire fascia, and body side moldings and the like which have bright surface
requirements.

BACKGROUND ART

15 Many parts such as automotive parts are metal-plated after they are
formed. The plating process requires elaborate facilities and consequently
necessitates large expenses. For instance, significant square footage of a factory
must be dedicated to such an environment for the plating of chrome on components
20 such as those components used in the automotive industry, such as bumpers, bumper
guards, side moldings, and the like. Moreover, certain metals have in recent years
raised significant environmental concerns. As a result, such metals must be strictly
monitored to satisfy environmental and safety regulations.

25 U.S. Patent No. 5,626,704 discloses a composite automotive trim
strip having a thermoplastic shell secured to the front of a support member.

U.S. Patent No. 4,999,227 discloses an automotive bumper comprising a shell of injection molded plastic that is plated with chromium metal.

5 U.S. Patent No. 5,741,446 discloses a method for producing a molded article, using a mold assembly having a cavity and an insert block formed of ceramic or glass.

U.S. Patent No. 3,740,918 discloses a decorative trim strip comprising an elongate channel-shaped base molding having a vinyl or plastic decorative trim piece adhesively secured thereto.

10 U.S. Patent No. 4,431,711 discloses a corrosion and abuse resistant plastic object that is vacuum metalized with a corrosion prone metal on a dielectric substrate.

U.S. Patent No. 3,934,385 discloses a trim strip for an automotive body panel having a flexible plastic decorative covering secured to a core.

15 U.S. Patent No. 4,902,557 discloses a method and apparatus for manufacturing a thermoplastic polyolefin composite useful as an exterior auto or truck body part. A polyester film is fed through a roll roller coater to apply first a clear coating and then a pigmented coating. A layer of thermoplastic chlorinated polyolefin provides intercoat adhesion of the pigmented layer to a polyolefin resin layer. In other words, a clear coat and then a color coat over the clear coat is
20 applied to a polyester film in the form of Mylar. The resulting coated polyester film is then laminated to a thermoplastic polyolefin sheet. Then the polyester film is stripped off. The resulting face sheet is thermoformed into a shaped structure. This resulting face sheet does not include the stripped off polyester film.

25 U.S. Patent No. 5,529,336 discloses a chromed or silvered applique and a plastic liner extruded onto the applique to form a sheet. The sheet is cut to form an applique member which is vacuum-formed. The vacuum-formed member is then insert molded with a plastic base.

U.S. Patent No. 4,769,100 teaches a method of applying a carrier film pre-printed with metallic paint to an automobile body panel in a vacuum forming process. In other words, the carrier film is applied to automobile body panels in a vacuum forming process wherein a bottom surface of the carrier film is coated with
5 a layer of adhesive.

U.S. Patent Nos. 4,952,351 and 5,466,412 teach a method of manufacturing an air bag cover for an inflatable air bag system including a bondable film carrier, which is painted after the film carrier is molded.

However, the prior art fails to provide a method of manufacturing a
10 metal-covered component wherein the step of plating the component after molding is eliminated and further where the component has the structural integrity both in terms of durability and strength to support varying applications including vehicle exterior applications.

DISCLOSURE OF INVENTION

15 An object of the present invention is to provide a molding method and a resulting metal-covered plastic component formed without plating the component.

Another object of the present invention is to provide a molding method and a metal-covered plastic component formed thereby wherein molding scrap due to minor surface imperfections on the plastic can be reduced by completely
20 covering the surface imperfections by the metal covering.

Yet still another object of the present invention is to provide a molding method and a metal-covered plastic component, such as a partial or entire fascia, body side moldings, and the like, wherein the component has increased durability yet has a bright surface.

25 In carrying out the above objects and other objects of the present invention a method is provided for manufacturing a metal-covered, molded plastic

component. The method includes providing a film sheet having a decorative layer of metal. The film sheet is selected from the group consisting of polyester, polyurethane and polycarbonate. The method further includes forming the film sheet to obtain a preform, and placing the preform in a mold cavity of an injection mold having a shape defining the desired plastic component. The method also includes injecting a thermoplastic elastomer into the mold cavity of the injection mold to generate a structural carrier for the preform. The generation of the structural carrier creates sufficient pressure and heat to bond the structural carrier to a bottom surface of the preform to form the metal-covered molded plastic component. The method finally includes preventing the preform from moving in the mold cavity during the step of injecting.

Preferably, the thermoplastic elastomer is selected from the group consisting essentially of a thermoplastic polyolefin, thermoplastic urethane, polyester, polycarbonate, acrylonitrile/ butadiene/styrene, polypropylene, lomod, bexloy, a mixture of acrylonitrile/butadiene/styrene and polycarbonate, and mixtures thereof.

Also, preferably, the step of injecting a thermoplastic elastomer into the mold cavity occurs at a temperature of approximately 420°F and at a pressure of 50 psi to 15,000 psi.

The method may include the step of cutting the preform prior to the step of placing.

The structural carrier may have a flexural modulus in the range of 15,000 to 400,000 psi.

The structural carrier may have a durometer in the range of 15 Shore D to 100 Shore D.

The film sheet preferably has a total thickness of approximately 0.2 mils.

Further in carrying out the above objects and other objects of the present invention, a method of manufacturing a metal-covered, molded laminate automotive component is provided. The method includes inserting a film sheet having a decorative layer of metal into a forming station to form the film sheet into a predetermined automotive component shape to create a formed film sheet having top and bottom surfaces. The film sheet is selected from the group consisting of polyester, polyurethane and polycarbonate. The method further includes placing the formed film sheet in a mold cavity of an injection mold having a shape defining the automotive component. The method also includes injecting a thermoplastic elastomer into the mold cavity of the injection mold, such that the thermoplastic elastomer is in mating contact with the bottom surface of the formed film sheet, to generate a structural carrier for the formed film sheet. The generation of the structural carrier creates sufficient pressure and heat to bond the structural carrier to the bottom surface of the formed film sheet to form the metal-covered, molded laminate automotive component. The preform is prevented from moving in the mold cavity during the step of injecting.

Still further in carrying out the above objects and other objects of the invention, a method of manufacturing a metal-covered, molded plastic component is provided. The method includes providing a film sheet having a decorative layer of metal. The film sheet is selected from the group consisting of polyester, polyurethane and polycarbonate. The method further includes forming the film sheet to obtain a preform and placing the preform in a mold cavity of an injection mold having a shape defining the desired plastic component. The method also includes injecting a thermoplastic elastomer into the mold cavity of the injection mold to generate a structural carrier for the preform. The generation of the structural carrier creates sufficient pressure and heat to bond the structural carrier to the bottom surface of the preform to form the molded laminate plastic component wherein the decorative layer of metal is coated with polyvinylidene fluoride and a clear plastic layer.

The polyvinylidene fluoride may comprise more than 50% of the total thickness of the film sheet.

5 The thermoplastic elastomer may be selected from the group consisting of a thermoplastic polyolefin, thermoplastic urethane, polyester, polycarbonate, acrylonitrile/ butadiene/styrene, polypropylene, a mixture of acrylonitrile/butadiene/styrene and polycarbonate, and mixtures thereof.

The step of injecting a thermoplastic elastomer into the mold cavity may occur at a temperature of approximately 420 °F and at a pressure of 50 psi to 15,000 psi.

10 The method may include the step of cutting the preform prior to the step of placing.

The structural carrier may have a flexural modulus in the range of 15,000 to 400,000 psi.

15 The structural carrier may have a durometer in the range of 15 Shore D to 100 Shore D.

The film sheet may have a total thickness of approximately 0.2 mils.

20 Still further in carrying out the above objects and other objects of the invention, a method of manufacturing a metal-covered, molded laminate automotive component is provided. The method includes inserting a film sheet having a decorative layer of metal into a forming station to form the film sheet into a predetermined automotive component shape to create a formed film sheet having top and bottom surfaces. The film sheet is selected from the group consisting of polyester, polyurethane and polycarbonate. The method further includes placing the formed film sheet in a mold cavity of an injection mold having a shape defining the automotive component. The method also includes injecting a thermoplastic elastomer into the mold cavity of the injection mold, such that the thermoplastic

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elastomer is in mating contact with a bottom surface of the formed film sheet to generate a structural carrier for the formed film sheet. The generation of the structural carrier creates sufficient pressure and heat to bond the structural carrier to the bottom surface of the formed film sheet to form the molded laminate automotive component. The decorative layer of metal is coated with a layer of polyvinylidene fluoride and a clear plastic layer.

The polyvinylidene fluoride may comprise more than 50% of the total thickness of the film sheet.

The above objects and other objects, features, and advantages of the present invention are readily apparent from the following detailed description of the best mode for carrying out the invention when taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

FIGURE 1 is a top plan view of a plastic component in the form of a fascia manufactured in accordance with the present invention and adapted to be mounted on an automotive vehicle;

FIGURE 2 is a broken-away view of the various layers of the fascia separated to illustrate the layers and wherein the thicknesses of the layers are not to scale;

FIGURE 3 is a side view of a thermoformed preform prior to insertion into an injection mold;

FIGURE 4 is a schematic view, partially broken away and in cross section, of a conventional injection mold which may be utilized to make plastic components of the present invention; the mold is depicted in an open position with the preform placed between two halves of the mold;

FIGURE 5 is a schematic view of the mold of Figure 4 in a closed position, with the preform held at a predetermined location in a mold cavity defined by two halves of the mold; and

5 FIGURE 6 is a schematic view of the mold of Figure 4 depicting the mold cavity with the molten resin injected therein to form the structural carrier for the preform thereby resulting in the metal-covered component.

BEST MODE FOR CARRYING OUT THE INVENTION

While the examples and figures provided herein refer to automotive plastic components, this invention has substantial application in other areas and is
10 thus intended to have broader scope than the cited representative examples. In essence, this invention can be used with any application calling for a plastic component having bright surface requirements such as partial or entire fascia, body side moldings, or the like.

Referring now to the drawing figures, there is illustrated in Figure 1
15 a top plan view of one type of fascia, generally indicated at 10, adapted to be mounted on an automobile. The fascia 10 includes a one-piece outer layer or preform 12, composed of a film sheet, preferably a film sheet having a decorative layer of metal such as chrome, which is thermoformed from a material compatible with a fascia body or structural carrier 14, which is preferably injection molded in
20 an injection mold 22 as illustrated in Figures 4-6. The fascia body 14 is preferably composed of a thermoplastic elastomer. The elastomer of the fascia body or structural carrier 14 should be compatible with the outer layer 12 so that a bottom contact surface of the outer layer 12, mounts with the front contact surface of the fascia body 14 by diffusion between the surfaces thereof in the injection mold 22 to
25 prevent the fascia body 14 from separating from the outer layer 12 during use of the fascia 10.

The outer layer 12 includes a film sheet that has a decorative layer of shiny metal such as chrome preformed thereon. The film sheet is preferably a polyester sheet such as Mylar®, a polyurethane or polycarbonate sheet.

As shown in Figure 3, in the preferred embodiment, the outer layer 12 includes a film sheet with the following coatings or layers placed thereon, a decorative layer of metal such as chrome in mating contact with the film sheet to form a film 16 and a layer 18 of polyvinylidene fluoride (PVDF) (*i.e.*, Tevlar®) with a clear coat 20 to protect the film 16 from damage and to provide film elasticity, chemical resistance, stain resistance, weathering and UV protection. The clear coat 20 may be a polyethylene or a polyvinylchloride which is slightly "sticky" to provide friction to prevent movement of a preform within the mold 22 during injection molding. In the most preferred embodiment, PVDF comprises 72% of the total thickness of the outer layer 12 which is approximately 0.2 mils.

The thermoplastic elastomer of the fascia body or structural carrier 14 is preferably a thermoplastic elastomer such as a thermoplastic polyolefin, thermoplastic urethane, polyester, polycarbonate, a mixture of polycarbonate and ABS (acrylonitrile/butadiene/styrene) or similar material.

For other automotive applications, the carrier 14 is varied to accommodate the intended use. Accordingly, for bumper/fascia applications, the structural carrier 14 can be selected from at least the following materials: Iomod®, bexloy® and thermoplastic polyolefin. For cluster bezel applications, the structural carrier 14 can be selected from at least the following materials: ABS (acrylonitrile/butadiene/styrene), a mixture of polycarbonate and ABS, polycarbonate, and polypropylene.

The durometer and elastic or flex modulus of the materials also vary depending on the desired stiffness of the component. Typically, the durometer of the fascia body 14 will be in the range of about 20 Shore D to 100 Shore D, while the flexural modulus will be in the range of about 15,000 to about 400,000 psi. Also, typically, the durometer of the outer layer 12 will be in the range of about 15

Shore A to 100 Shore A. These ranges of course vary depending on the desired plastic component to be manufactured and are only illustrative of one example.

As depicted in Figure 2, a sectional, partially broken-away view of the layers of the fascia 10 of Figure 1 is shown. The fascia body or structural carrier 14 supports the outer layer 12 which has the film 16 placed thereon, followed by the PVDF layer 18, and a clear plastic coat 20, preferably a PE (polyethylene) protective layer or a polyvinylchloride clear coat, both of which are slightly "sticky" to prevent movement of the preform 12 within the mold cavity 20.

Referring now to Figure 4, there is illustrated the conventional plastic injection mold 22 for making a plastic component pursuant to the present invention. Briefly, with the injection mold 22 there is included a sprue 24 for injecting predetermined amounts or shots of molten resin. The one-piece outer layer 12 is initially vacuum molded or thermoformed to form the curved preform 12. Opposing surfaces of male and female mold halves 26 and 28, respectively, of the mold 22 define a mold cavity 30 into which the preform 12 is placed.

As illustrated in Figure 5, there is a depiction of the one-piece preform 12 created from the vacuum molded or thermoformed film sheet which was first placed in the mold cavity 30 as illustrated in Figure 4. The preform 12 is preferably secured to the mold half 28 within the mold cavity by either an adhesive, tape, or by applying a vacuum to the mold half 28. An adhesive coated on the clear coat 20 stabilizes the preform 12 in the cavity 30 as plastic material flows over the preform 12 to produce the substrate or carrier 14 and thus the fascia 10.

Thereafter, as depicted in Figure 6, the fascia body or structural carrier 14 is molded in the plastic injection mold 22 to form the completed unitary laminate plastic component 10. The plastic flow does not disrupt the position of the preform 12 in the cavity 30. The lower mold half 28 may have style lines formed therein and the preform 12 may have a curl design at its edges to prevent the preform 12 from catching the plastic flow and thereby disturbing the position of the preform 12.

5 The body 14 of the fascia 10 may also be formed from thermoplastic polyolefin, polycarbonate, tee tpe, sebs tpe, and a mixture of polycarbonate and acrylonitrile/butadiene/styrene (ABS). The corresponding film sheet 12 must be compatible with the plastic of the body 14 so that diffusion between contact surfaces occurs. Additionally, the laminate should be compatible with the substrate on which the laminate is to be adhered. In general, this requirement is achieved by selecting a structural carrier 14 with at least one or more materials common to the substrate on which the laminate is to be adhered. As an example, with a thermoplastic polyolefin substrate, the structural carrier should include polypropylene.

10 In an alternative embodiment, the mold can be modified to produce a plastic component with embossed lettering. This embossed effect is achieved by etching into the mold the desired pattern or letters so that the letters have at least a 0.5 mm radius on the edge of the letter, or else the film will tear and stretch.

15 The unique features of the laminate plastic components are 1) a stiff inner material to support the intended application; 2) reduction and/or elimination of metal plating problems; 3) reduced molding scrap due to splay, flow marks and minor surface imperfections, which can be completely covered; and 4) increased durability of the resulting plastic laminate components.

20 It should be understood that the film sheet can be positioned in the injection mold either by way of a preform, as described above, or by way of a film roll supply. In this way, one can mold in the decorative metal layer at the press or mold thereby avoiding a secondary plating operation.

25 While the best mode for carrying out the invention has been described in detail, those familiar with the art to which this invention relates will recognize various alternative designs and embodiments for practicing the invention as defined by the following claims.

WHAT IS CLAIMED IS:

1 1. A method of manufacturing a metal-covered, molded plastic
2 component, comprising:
3 providing a film sheet having a decorative layer of metal, the film
4 sheet being selected from the group consisting of polyester, polyurethane and
5 polycarbonate;
6 forming the film sheet to obtain a preform;
7 placing the preform in a mold cavity of an injection mold having a
8 shape defining the desired plastic component;
9 injecting a thermoplastic elastomer into the mold cavity of the
10 injection mold to generate a structural carrier for the preform, the generation of the
11 structural carrier creating sufficient pressure and heat to bond the structural carrier
12 to a bottom surface of the preform to form the metal-covered molded plastic
13 component; and
14 preventing the preform from moving in the mold cavity during the
15 step of injecting.

1 2. The method of claim 1, wherein the thermoplastic elastomer
2 is selected from the group consisting essentially of a thermoplastic polyolefin,
3 thermoplastic urethane, polyester, polycarbonate, acrylonitrile/ butadiene/styrene,
4 polypropylene, a mixture of acrylonitrile/butadiene/styrene and polycarbonate, and
5 mixtures thereof.

1 3. The method of claim 1, wherein the step of injecting a
2 thermoplastic elastomer into the mold cavity occurs at a temperature of
3 approximately 420°F and at a pressure of 50 psi to 15,000 psi.

1 4. The method of claim 1, further comprising the step of cutting
2 the preform prior to the step of placing.

1 5. The method of claim 1, wherein the structural carrier has a
2 flexural modulus in the range of 15,000 to 400,000 psi.

1 6. The method of claim 1, wherein the structural carrier has a
2 durometer in the range of 15 Shore D to 100 Shore D.

1 7. The method of claim 1, wherein the film sheet has a total
2 thickness of approximately 0.2 mils.

1 8. A method of manufacturing a metal-covered, molded laminate
2 automotive component, comprising:

3 inserting a film sheet having a decorative layer of metal into a forming
4 station to form the film sheet into a predetermined automotive component shape to
5 create a formed film sheet having top and bottom surfaces, the film sheet being
6 selected from the group consisting of polyester, polyurethane and polycarbonate;

7 placing the formed film sheet in a mold cavity of an injection mold
8 having a shape defining the automotive component;

9 injecting a thermoplastic elastomer into the mold cavity of the
10 injection mold, such that the thermoplastic elastomer is in mating contact with the
11 bottom surface of the formed film sheet, to generate a structural carrier for the
12 formed film sheet, the generation of the structural carrier creating sufficient pressure
13 and heat to bond the structural carrier to the bottom surface of the formed film sheet
14 to form the metal-covered, molded laminate automotive component; and

15 preventing the preform from moving in the mold cavity during the
16 step of injecting.

1 9. A method of manufacturing a metal-covered, molded plastic
2 component, comprising:

3 providing a film sheet having a decorative layer of metal, the film
4 sheet being selected from the group consisting of polyester, polyurethane and
5 polycarbonate;

6 forming the film sheet to obtain a preform;

7 placing the preform in a mold cavity of an injection mold having a
8 shape defining the desired plastic component; and

9 injecting a thermoplastic elastomer into the mold cavity of the
10 injection mold to generate a structural carrier for the preform, the generation of the
11 structural carrier creating sufficient pressure and heat to bond the structural carrier
12 to the bottom surface of the preform to form the molded laminate plastic component
13 wherein the decorative layer of metal is coated with polyvinylidene fluoride and a
14 clear plastic layer.

1 10. The method of claim 9, wherein the polyvinylidene fluoride
2 comprises more than 50% of the total thickness of the film sheet.

1 11. The method of claim 9, wherein the thermoplastic elastomer
2 is selected from the group consisting of a thermoplastic polyolefin, thermoplastic
3 urethane, polyester, polycarbonate, acrylonitrile/ butadiene/styrene, polypropylene,
4 a mixture of acrylonitrile/butadiene/styrene and polycarbonate, and mixtures thereof.

1 12. The method of claim 9, wherein the step of injecting a
2 thermoplastic elastomer into the mold cavity occurs at a temperature of 420°F and
3 at a pressure of 50 psi to 15,000 psi.

1 13. The method of claim 9, further comprising the step of cutting
2 the preform prior to the step of placing.

1 14. The method of claim 9, wherein the structural carrier has a
2 flexural modulus in the range of 15,000 to 400,000 psi.

1 15. The method of claim 9, wherein the structural carrier has a
2 durometer in the range of 15 Shore D to 100 Shore D.

1 16. The method of claim 9, wherein the film sheet has a total
2 thickness of approximately 0.2 mils.

1 17. A method of manufacturing a metal-covered, molded laminate
2 automotive component, comprising:

3 inserting a film sheet having a decorative layer of metal into a forming
4 station to form the film sheet into a predetermined automotive component shape to
5 create a formed film sheet having top and bottom surfaces, the film sheet being
6 selected from the group consisting of polyester, polyurethane and polycarbonate;
7 placing the formed film sheet in a mold cavity of an injection mold
8 having a shape defining the automotive component;
9 injecting a thermoplastic elastomer into the mold cavity of the
10 injection mold, such that the thermoplastic elastomer is in mating contact with a
11 bottom surface of the formed film sheet, to generate a structural carrier for the
12 formed film sheet, the generation of the structural carrier creating sufficient pressure
13 and heat to bond the structural carrier to the bottom surface of the formed film sheet
14 to form the molded laminate automotive component wherein the decorative layer of
15 metal is coated with a layer of polyvinylidene fluoride and a clear plastic layer.

1 18. The method of claim 17, wherein the polyvinylidene fluoride
2 comprises more than 50% of the total thickness of the film sheet.

1 19. A metal-covered component manufactured by the method of
2 claim 1, claim 8, claim 9 or claim 17.

ABSTRACT OF THE DISCLOSURE

A molding method and a metal-covered plastic component such as partial or entire fascia, body side moldings, and the like, which have bright surface requirements and which includes a film sheet and a one-piece thermoplastic elastomeric structural carrier are provided. The film sheet includes a decorative layer of metal such as chrome. A plastic layer of the film sheet on which the layer of metal is formed is selected from a group consisting of polyester, polyurethane and polycarbonate. A bottom contact surface of the film sheet bonds with a front contact surface of the structural carrier by diffusion between the contact surfaces thereof within a mold cavity of an injection mold separate from the step of forming a preform which is securely positioned within the injection mold during injection molding to form the plastic part.

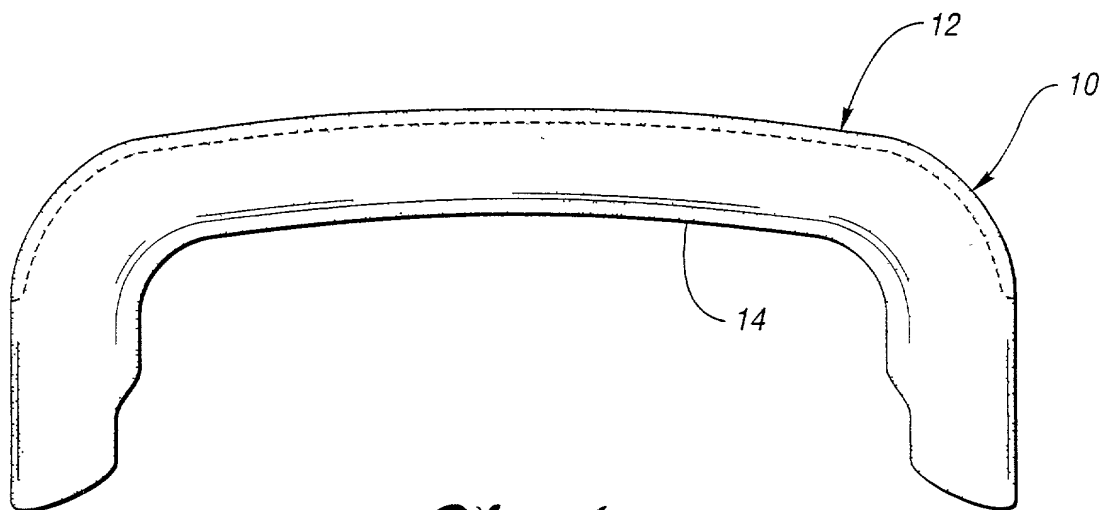


Fig. 1

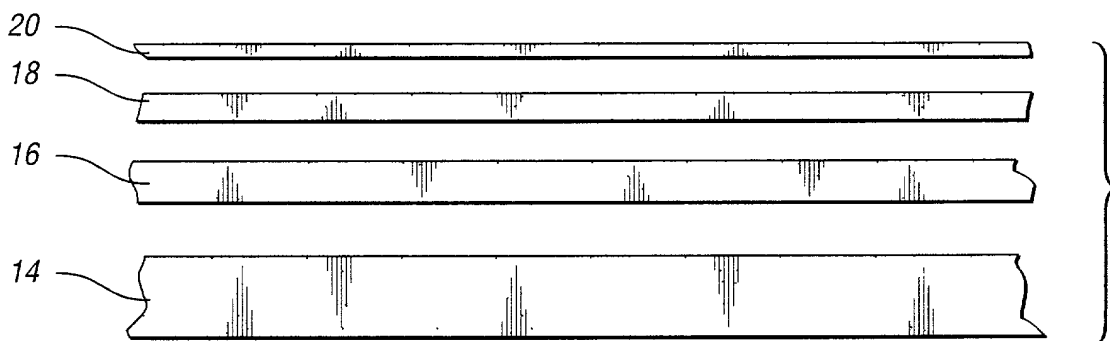


Fig. 2



Fig. 3

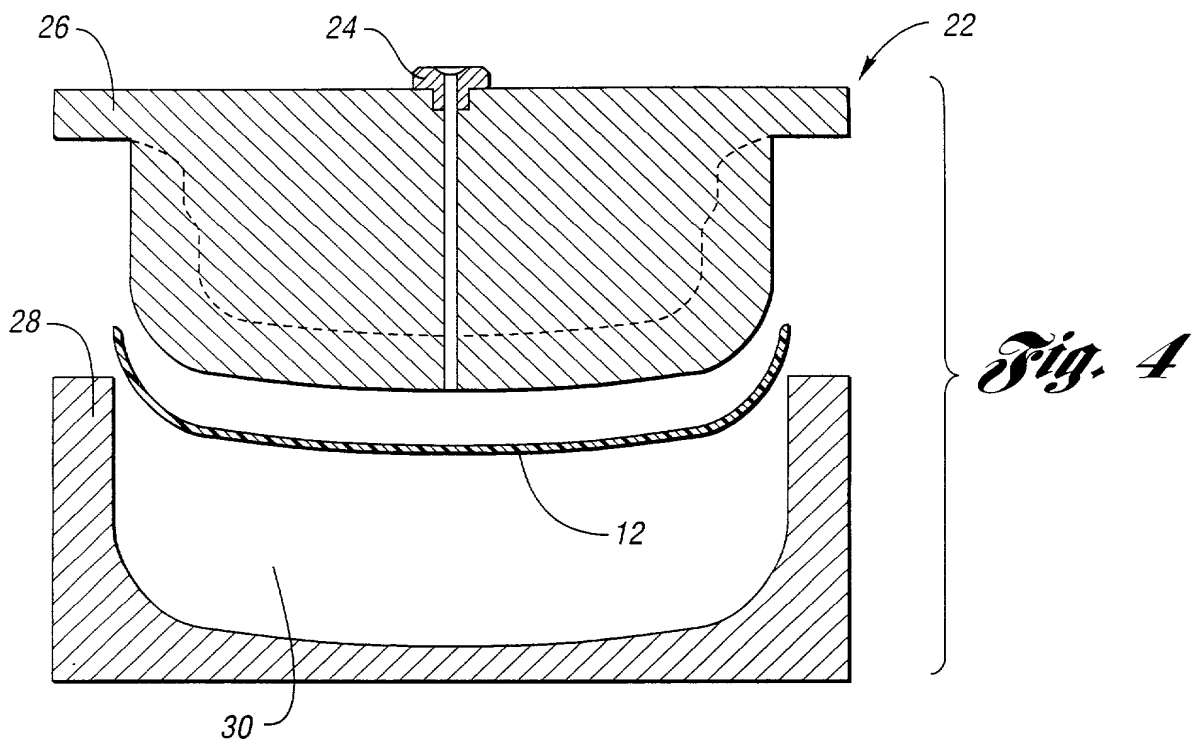


Fig. 4

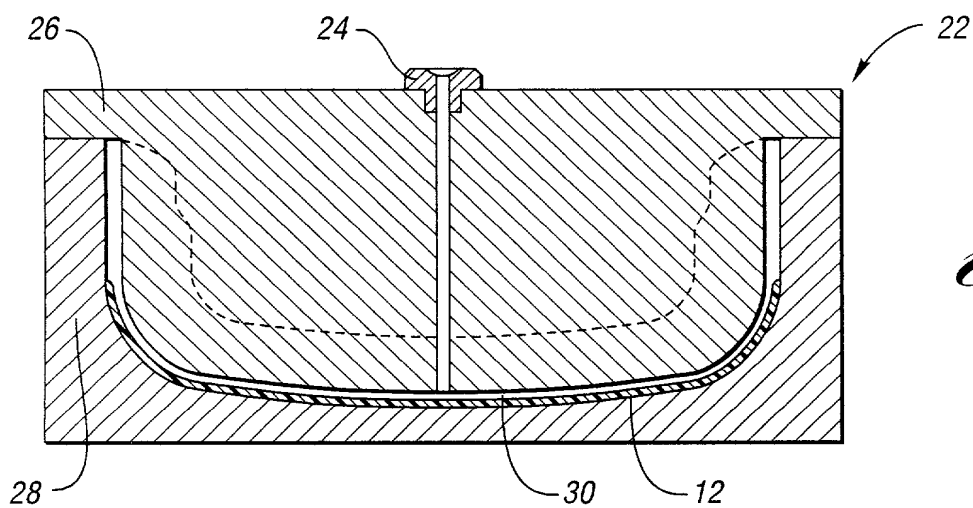


Fig. 5

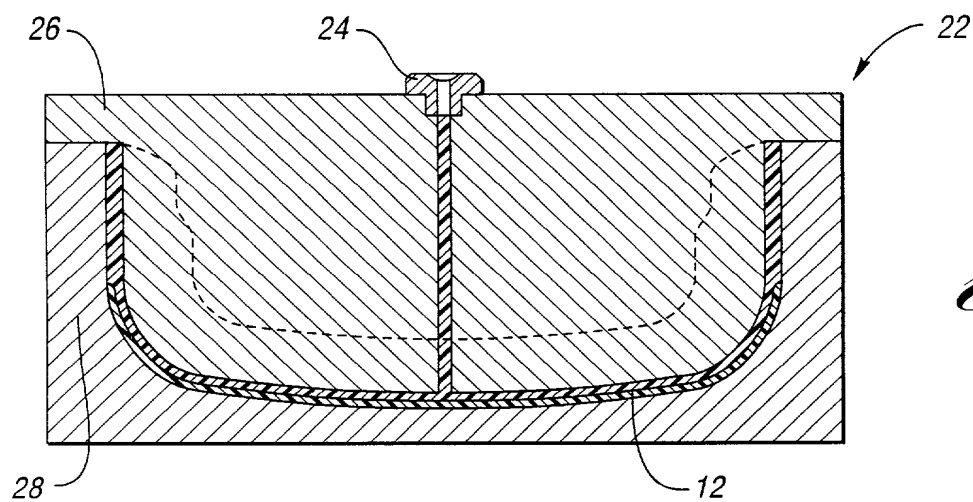


Fig. 6